

## SEQUENCE LISTING

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 HIRAOKA, HIROTOSHI  
 UEDA, MAKOTO  
 UEHARA, HISATOSHI

<120> METHOD FOR PRODUCING ALCOHOL AND CARBOXYLIC ACID  
 HAVING OPTICAL ACTIVITY

<130> P30416

<140> 10/588,286

<141> 2006-08-04

<150> PCT/JP05/02093

<151> 2005-02-04

<150> JP 027815/2004

<151> 2004-02-04

<150> JP 147023/2004

<151> 2004-04-13

<160> 13

<170> PatentIn Ver. 3.3

<210> 1

<211> 345

<212> PRT

<213> Issatchenkia scutulata

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Lys	Lys	Tyr	Pro	Asp	Ala	Asn	Leu	Thr	Phe	Glu	Val	Val	Pro	Asp	Ile
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Ile Thr Ser Ser Tyr Ala Ala Ile Met Thr Gly Asn Pro Ser His Val  
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 145 150 155 160  
 Asn Glu Tyr Phe Ala Tyr Ile Ala Ser Lys Thr Tyr Ala Glu Lys Ala  
 165 170 175  
 Ala Arg Asp Phe Val Lys Glu His Lys Val Asn Phe Lys Leu Ala Thr  
 180 185 190  
 Val Asn Pro Pro Tyr Val Leu Gly Pro Gln Leu Phe Asp Phe Ser Val  
 195 200 205  
 Gly Pro Val Leu Asn Thr Ser Asn Gln Leu Ile Thr Asp Ala Thr Lys  
 210 215 220  
 Ile Asp Lys Asn Ser Thr Lys Pro Glu Leu Gly Thr Pro Ala Leu Ala  
 225 230 235 240  
 Val Asp Val Arg Asp Val Ala Ala Phe His Val Leu Pro Leu Glu Asp  
 245 250 255  
 Asp Lys Val Ala Ser Glu Arg Leu Phe Ile Val Ala Gly Pro Ala Val  
 260 265 270  
 Val Gln Thr Phe Leu Asn Ile Ile Asn Glu Asn Ile Pro Glu Leu Lys  
 275 280 285  
 Gly Lys Val Ala Leu Gly Asp Pro Ala Ser Glu Lys Glu Leu Ile Glu  
 290 295 300  
 Lys His Thr Asp Lys Tyr Asp Leu Thr Asn Leu His Asn Val Ile Gly  
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 caaccaatcc ttgatgcttt caagaaaaaa taccctgatg caaatttgac ttttgaagtt 180  
 gtccctgaca tctccactga aaacgcatte gatgatgttt tgaagaagca tccagaaatt 240  
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 gcatatttga agcctgccgt tgatggtact ttgaatattc tcaaggcaat tgagaagtat 360  
 gcaccacagg ttactaaagt tgttatcaca tcttcttatg ctgcaattat gacaggtaat 420  
 ccaagtcattg tccacaccag tgaacctgg aaccctaatta attgggaaaa cgatgtgaag 480

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gatgcgacta aaattgataa gaactctact aagccggaat taggtacacc agcttttagca 720
gtcgatgtta gagatgttgc tgcgttccat gttttacat tggaagatga taaagttgca 780
agtgaagat tattttattgt tgctgggtcca gcagttgttc aaacattctt aaacatcatc 840
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gagttgattg aaaagcacac agataagtat gatttgacaa atcttcacaa cgttattggt 960
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Val Arg Ser His Glu Lys Glu Ala Lys Leu Leu Arg Gln Phe Gln His
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Asn Pro Asn Leu Thr Leu Glu Ile Val Pro Asp Ile Ser His Pro Asn
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Ala Phe Asp Lys Val Leu Gln Lys Arg Gly Arg Glu Ile Arg Tyr Val
      65              70              75              80

Leu His Thr Ala Ser Pro Phe His Tyr Asp Thr Thr Glu Tyr Glu Lys
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Asp Leu Leu Ile Pro Ala Leu Glu Gly Thr Lys Asn Ile Leu Asn Ser
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Ile Lys Lys Tyr Ala Ala Asp Thr Val Glu Arg Val Val Val Thr Ser
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Ser Cys Thr Ala Ile Ile Thr Leu Ala Lys Met Asp Asp Pro Ser Val
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Val Phe Thr Glu Glu Ser Trp Asn Glu Ala Thr Trp Glu Ser Cys Gln
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Ile Asp Gly Ile Asn Ala Tyr Phe Ala Ser Lys Lys Phe Ala Glu Lys
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Ala Ala Trp Glu Phe Thr Lys Glu Asn Glu Asp His Ile Lys Phe Lys
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Leu Thr Thr Val Asn Pro Ser Leu Leu Phe Gly Pro Gln Leu Phe Asp
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Leu Ile His Thr Pro Val Asn Ala Ser Val Pro Asp Phe His Ser Ile  
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Phe Ile Asp Val Arg Asp Val Ala Leu Ala His Leu Tyr Ala Phe Gln  
 245 250 255

Lys Glu Asn Thr Ala Gly Lys Arg Leu Val Val Thr Asn Gly Lys Phe  
 260 265 270

Gly Asn Gln Asp Ile Leu Asp Ile Leu Asn Glu Asp Phe Pro Gln Leu  
 275 280 285

Arg Gly Leu Ile Pro Leu Gly Lys Pro Gly Thr Gly Asp Gln Val Ile  
 290 295 300

Asp Arg Gly Ser Thr Thr Asp Asn Ser Ala Thr Arg Lys Ile Leu Gly  
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Phe Glu Phe Arg Ser Leu His Glu Ser Val His Asp Thr Ala Ala Gln  
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<210> 4

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<213> Issatchenkia scutulata

<400> 4

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Asp Ile

<210> 5

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agttgtccct gacatctcca ctgaaaacgc attcgatgat gttttgaaga agcatccaga 180  
aattactgct gtccttcaca cagcatctcc attctctttt ggtttgaaca aggatctgaa 240  
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Ser Asn Lys Thr Val Leu Val Thr Gly Ala Thr Gly Phe Ile Ala Leu	
5 10 15	
cac atc att gat aat tta ttg tct aag ggt tat tcc gtt att ggt aca	153
His Ile Ile Asp Asn Leu Leu Ser Lys Gly Tyr Ser Val Ile Gly Thr	
20 25 30	
gct aga tcc caa tct aaa tat caa cca atc ctt gat gct ttc aag aaa	201
Ala Arg Ser Gln Ser Lys Tyr Gln Pro Ile Leu Asp Ala Phe Lys Lys	
35 40 45	
aaa tac cct gat gca aat ttg act ttt gaa gtt gtc cct gac atc tcc	249
Lys Tyr Pro Asp Ala Asn Leu Thr Phe Glu Val Val Pro Asp Ile Ser	
50 55 60 65	
act gaa aac gca ttc gat gat gtt ttg aag aag cat cca gaa att act	297
Thr Glu Asn Ala Phe Asp Asp Val Leu Lys Lys His Pro Glu Ile Thr	
70 75 80	
gct gtc ctt cac aca gca tct cca ttc tct ttt ggt ttg aac aag gat	345
Ala Val Leu His Thr Ala Ser Pro Phe Ser Phe Gly Leu Asn Lys Asp	
85 90 95	
ctg aag gaa gca tat ttg aag cct gcc gtt gat ggt act ttg aat att	393
Leu Lys Glu Ala Tyr Leu Lys Pro Ala Val Asp Gly Thr Leu Asn Ile	
100 105 110	
ctc aag gca att gag aag tat gca cca cag gtt act aaa gtt gtt atc	441
Leu Lys Ala Ile Glu Lys Tyr Ala Pro Gln Val Thr Lys Val Val Ile	
115 120 125	
aca tct tct tat gct gca att atg aca ggt aat cca agt cat gtc cac	489
Thr Ser Ser Tyr Ala Ala Ile Met Thr Gly Asn Pro Ser His Val His	
130 135 140 145	
acc agt gaa acc tgg aac cca att aat tgg gaa aac gat gtg aag aat	537
Thr Ser Glu Thr Trp Asn Pro Ile Asn Trp Glu Asn Asp Val Lys Asn	
150 155 160	
gaa tac ttt gca tat att gcc tcc aag acg tat gct gaa aaa gct gcg	585
Glu Tyr Phe Ala Tyr Ile Ala Ser Lys Thr Tyr Ala Glu Lys Ala Ala	
165 170 175	
aga gat ttt gtc aag gag cat aag gtc aat ttc aag tta gca act gtt	633
Arg Asp Phe Val Lys Glu His Lys Val Asn Phe Lys Leu Ala Thr Val	
180 185 190	
aac cca cca tac gtt ctg ggt cca caa tta ttt gac ttc tca gtt ggt	681
Asn Pro Pro Tyr Val Leu Gly Pro Gln Leu Phe Asp Phe Ser Val Gly	
195 200 205	
cca gtc ttg aac act tcc aac caa ttg atc acg gat gcg act aaa att	729
Pro Val Leu Asn Thr Ser Asn Gln Leu Ile Thr Asp Ala Thr Lys Ile	
210 215 220 225	

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Asp Lys Asn Ser Thr Lys Pro Glu Leu Gly Thr Pro Ala Leu Ala Val
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gat gtt aga gat gtt gct gcg ttc cat gtt tta cca ttg gaa gat gat 825
Asp Val Arg Asp Val Ala Ala Phe His Val Leu Pro Leu Glu Asp Asp
                245                250                255

aaa gtt gca agt gaa aga tta ttt att gtt gct ggt cca gca gtt gtt 873
Lys Val Ala Ser Glu Arg Leu Phe Ile Val Ala Gly Pro Ala Val Val
                260                265                270

caa aca ttc tta aac atc atc aac gag aac att cca gaa ctt aaa ggt 921
Gln Thr Phe Leu Asn Ile Ile Asn Glu Asn Ile Pro Glu Leu Lys Gly
                275                280                285

aag gtt gcc cta gga gat cca gct tca gag aag gag ttg att gaa aag 969
Lys Val Ala Leu Gly Asp Pro Ala Ser Glu Lys Glu Leu Ile Glu Lys
                290                295                300                305

cac aca gat aag tat gat ttg aca aat ctt cac aac gtt att ggt aaa 1017
His Thr Asp Lys Tyr Asp Leu Thr Asn Leu His Asn Val Ile Gly Lys
                310                315                320

tat gat ttc att cca gtt gaa aag tcc gtt gtc gac gtc tta gaa caa 1065
Tyr Asp Phe Ile Pro Val Glu Lys Ser Val Val Asp Val Leu Glu Gln
                325                330                335

tat tac aaa atc aat aaa att gat tagtttatat agaaaatttt atagctaaag 1119
Tyr Tyr Lys Ile Asn Lys Ile Asp
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